



The Use of Evidence to Improve Education and Serve the Public Good

Paper prepared for the New Zealand Ministry of Education and
the annual meeting of the American Educational Research Association, Vancouver,
Canada (April 2012)

Conference theme: **“Non Satis Scire: To Know Is Not Enough”**

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Abstract

This paper explores the challenge of mobilising research to inform ongoing improvement in valued outcomes for diverse (all) learners across school systems. The context is an innovative approach to brokering collaborative knowledge-building and use across educational policy, research, and practice communities in a jurisdiction of 2559 schools. The focus of this paper is on the use of three research resources as tools for knowledge mobilisation: best evidence syntheses (BES) on effective educational leadership, professional learning and development, and teaching; an inquiry and knowledge-building tool for improvement across a system, and BES exemplars of high-impact pedagogies. Such exemplars illuminate approaches that simultaneously advance multiple valued outcomes for diverse (all) learners including academic, social, and self-regulatory outcomes, a focus that goes directly to the potential for research evidence to advance the public good. The paper highlights how leverage has been and could be created for opportunities for improvement and identifies challenges that need to be addressed to support ongoing improvement at a systemic level. The paper is explicit about public good imperatives that require more deliberate action for accelerated improvement, especially in times of global economic and fiscal crisis. The paper calls for strategic investment in high-impact, collaborative research and development to:

- leverage and develop capability for accelerated improvement for those underserved by schooling;
- create an engine to drive disciplined innovation;
- ensure that policy reforms achieve deep changes in teaching and learning; and
- activate the educationally powerful connections with diverse learners and their communities, required for ongoing whole of system improvement.

The paper concludes with ten key messages to inform effective action in the use of evidence for educational improvement in the service of the public good.

Purposes

The intention for this paper is that it will advance improvement in education. Its objectives are to:

- explain an innovative approach to brokering the development and use of research knowledge about *what works, why, and how; what makes a bigger difference, and what does not work* for educational improvement for diverse (all) learners, across policy, research, and practice communities;
- highlight expertise, tools, and action needed for mobilising this knowledge through policy, research, and practice engagement, collaboration, and action; and
- identify challenges in systemic change processes in order to strengthen the role of knowledge mobilisation at a system level.

The purpose of the innovation is to use research evidence and advance the strategic use of collaborative research and development to improve education at a system level in ways that serve the public good; with consideration of value for investment in times of fiscal constraint. This purpose includes championing a ‘first do no harm’ principle in education as in health and finding ways to give that principle effect in policy and practice. ‘Improvement’ from a BES perspective means optimising ongoing educational improvement in valued outcomes for diverse (all) learners with a priority for accelerated improvement for learners who have been underserved in their education or disadvantaged.

Perspectives, Methodology, and Tools

The Iterative Best Evidence Synthesis (BES) Programme is a knowledge brokerage innovation situated within a national policy context in the New Zealand Ministry of Education. Because the focus of this paper is on challenges in mobilising research evidence for systemic improvement, brief consideration only is given to the BES methodology, which is documented elsewhere (Alton-Lee, 2004; 2004a; 2007) and illustrated throughout the paper.

The principle that drives the BES approach is that fit-for-purpose approaches are needed in the development and use of trustworthy knowledge for improvement. This principle was championed by Aristotle¹ when he argued that purpose should drive methodology in science so that knowledge-building would serve humanity (Aristotle, *De Anima* 1:10, in McKeon, 1968).

The BES approach calls for an unwavering benchmark of evidence of improvements in valued outcomes for diverse (all) learners. Much educational research does not attend to the empirical evidence about the relationship between educational influences and outcomes for learners; so the BES methodology is highly selective in the research studies included in syntheses, and gives particular weight to long-term effects.

The BES perspective on ‘diversity’ is that it matters. Any group of students brings diversity to a class or school context, whether by the socio-economic or other status of their families and/or caregivers, their gender, ethnicities, cultural capitals, special needs, resources, achievement levels, language proficiencies, sexuality, experiences of the world, and so on. All these dimensions influence learners’ identities, albeit in fluid ways, and all of them can variously be salient (or not) in education.

Educational practice within a schooling system is inherently complex because it requires working with diverse (all) learners simultaneously. Highly effective practice advances multiple valued outcomes for diverse (all) learners simultaneously. The term ‘all’ has been used to qualify ‘diverse’ because educational practice has so often focused on the perspectives of a particular cultural majority or group that ‘diverse’ in common parlance risks meaning ‘other’ or ‘marginalised’. This perspective normalises difference, and defines ‘what works’ in relation to what works for diverse (all) learners accordingly.

Because the Iterative Best Evidence Synthesis Programme is a New Zealand programme, it gives particular and targeted attention to what makes a bigger difference for diverse Māori (indigenous) learners in English- and Māori-medium education. The focus on valued outcomes includes a priority for

Māori to succeed as Māori in New Zealand education. The BES work is informed by the work of leading Māori researchers whose work has been identified as an area of national strength (Alcorn et al., 2004).

It is the theoretical and empirical findings from the series of best evidence syntheses themselves that drive thinking about the *what* and the *how* of improvement. The BES development methodology is informed by (and calls for) theoretical and methodological pluralism, attention to context, and a health-of-the-system perspective.

The paper also draws upon emerging understandings about effective knowledge mobilisation and educational change from wider research literatures.

The BES development approach is collaborative and iterative, inviting and depending on stakeholder engagement across policy, research, and practice to strengthen the usefulness of the work for its purpose. While the approach endeavours to embed ‘use’ in ‘development’, the programme has been funded only for development. Because of this, it takes a catalyst rather than a resourced role in brokering ‘use’.

The programme aspires to develop and champion the use of ‘smart tools’ for improvement in education. One of the critical BES findings is that leadership for the spread of improvement within a school or across a system can be exercised through selecting, developing, and using ‘smart tools’ in education (Robinson, Hohepa, & Lloyd, 2009). ‘Smart tools’ are fit-for-purpose, based on valid theories, and well-designed. ‘Smart tools’ can include effective pedagogical resources, classroom furniture, report formats, diagnostic tools, software and policy documents. They are smart if they promote teacher, policy, or leadership learning about how to promote student learning as they are used. Many of the ‘smart tools’ identified across the BES analyses are the result of investment in collaborative research and development.

In response to the challenge of the conference theme ‘*Non Satis Scire: To Know Is Not Enough*’, the paper focuses on high-impact, collaborative research and development. I use new BES exemplars to make visible the actual and potential leadership role of high-impact research and development in creating expertise for accelerated and ongoing system improvement. I highlight the gains for educators as they are supported to work smarter rather than harder² and the nature of the public good gains and value for investment such a resource can advance. I call for strategic investment of existing resources in economically constrained times to leverage and grow the expertise and capability needed to drive accelerated improvement that translates into economic growth, social capital, and public good.

Best Evidence Synthesis Iterations

The core resource for change is a series of syntheses of research evidence linked to valued student outcomes: the *what works* knowledge (for example: Aitken & Sinnema, 2008; Anthony & Walshaw, 2007; Robinson, Hohepa, & Lloyd, 2009; Timperley, Wilson, Barrar, & Fung, 2008).

BES development approach

To make them fit-for-purpose, the syntheses are scoped and developed through a collaborative and iterative national process involving researchers, stakeholders (teacher unions, principals' groups, educational agencies, and policy representatives), early peer-reviewed publications, and formative quality assurance. Professor Jere Brophy³ (2008) described this process from the perspective of a formative quality assurer, concluding: "In my opinion, their careful scholarship and practical utility positions the BES documents among the most important contributions to contemporary educational scholarship" (Brophy, 2008 in Aitken & Sinnema, 2008, p. 10).

Synthesis development is carried out using agreed national methodological guidelines (Alton-Lee, 2004). The guidelines require methodological pluralism in the selection of evidence, a responsiveness-to-diversity framework in the analysis (Alton-Lee, 2008), and attention to context in the consideration of the data. From the perspective of the philosophy of science, the approach is informed by scientific realism (Haig, 1987, 1991, 2004), requires careful consideration of disconfirming evidence, and privileges theory as a tool for change because it explains the *why* and the *how* of *what works* in ways that can support the development of adaptive expertise.

Where possible, effect sizes are used or constructed to inform the analysis of *what makes a bigger difference*. An effect size is a common measure of effect that enables comparisons to be made of effectiveness across a wide range of approaches and interventions that have been evaluated using a wide range of assessments (Hattie, 2009)⁴. An effect size can be calculated using the difference in results between a group who experienced an intervention and a group who did not. Alternatively, an effect size can be calculated using a measure of the progress made over the period of an intervention. An important element of the effect size calculation is the division by the standard deviation across the gain scores of those receiving the intervention or approach. If there are wide disparities in the gain scores, then the standard deviation is higher and the overall effect size is lower. Because of this feature, an effect size is

an indicator of effectiveness that inherently signals how equitable an intervention or approach is for diverse (all) learners.

Each synthesis includes extensive use of vignettes and case studies to illustrate findings in ways that bring the findings to life, explain the *how*, and are useful for practitioners.

Stakeholder contribution, engagement, and ownership

From the outset, stakeholder engagement is designed to optimise the usefulness of the syntheses and develop ownership of the new knowledge by leaders, teachers, and teacher educators. Such ownership is apparent in the range of stakeholder forewords to the best evidence syntheses, for example:

(The) Post Primary Teachers' Association welcomes this best evidence synthesis of Effective Pedagogy in Mathematics/Pāngarau. It is the result of a very thorough process, inclusive of the expertise of practitioners. The final report caters to their realities, and provides some very interesting reading and thought provoking reading for teachers themselves, and for those involved in the pre-service and in-service education of mathematics teachers.

(Debbie Te Whaiti, President, New Zealand Post Primary Teachers' Association, 2007. NZPPTA foreword in Anthony & Walshaw, 2007, p. xiii)

Every teacher I have met is the best teacher they know how to be. But unless we support our teachers with professional learning opportunities, they will act in isolation of the wider knowledge that research is making available and could enhance their effectiveness. The Teacher Professional Learning and Development BES has the potential to help teachers complete the loop by showing them how to effectively access and use new pedagogical understandings in their daily practice.

(Graham Young, past president, Secondary Principals' Association of New Zealand. NZSPANZ foreword in Timperley et al., 2008, p. x)

NZEI Te Riu Roa (New Zealand's Primary Teachers Union) welcomes the opportunity to comment on this Best Evidence Synthesis [Effective pedagogy in social sciences/Tikanga ā iwi BES]. Drawing widely and systematically from national and international research on social sciences education, its authors have sought evidence of what works, for which students, and in what circumstances. The synthesis of findings contributes to our understanding of the relationship between pedagogy and outcomes and the importance of context. Teachers will welcome the many practical ways in which to strengthen practice – a particular feature of the BES Programme.

(Frances Nelson, National President, New Zealand Educational Institute. NZEI Te Riu Roa foreword in Aitken & Sinnema, 2008, p. 15)

Te Akatea Māori Principals' Association has been involved in the School leadership and student outcomes BES from start to finish because we are committed to and understand that school leadership has such an impact on the educational achievement and life opportunities for all our young people.

As we have had input at various stages of the project, we have raised issues, noted gaps, and made valued suggestions. By doing so we have been able to ensure that the published document contains our voice and speaks to our realities.

We want to see all educational leaders, not just principals, take the findings of this BES on board. It provides a rich source of research findings that can be used as a basis for productive professional conversations, particularly when it comes to shifting the focus from challenges to opportunities. It also contains much that can help leaders build trusting, respectful relationships with colleagues, students, parents and whānau.

(Debbie Marshall-Lobb, Shane Ngatai, & Para Meha, Current and past presidents, Te Akatea. Te Akatea foreword in Robinson, Hohepa, & Lloyd, 2009, pp. 12–13)

The challenge, now, for all associated with student learning is to turn these findings into reality. Schools have to use data to guide them in their strategic planning, and with the publication of this BES, data is now available for the authorities to use to make decisive and effective changes in school leadership. To ignore this research would be to blight the chances of current and future generations of New Zealand students.

(John Garner for the New Zealand Area Schools Association. NZASA foreword in Robinson, Hohepa, & Lloyd, 2009, p. 20)

BES as a catalyst for knowledge-steering for improvement

The Iterative Best Evidence Synthesis Programme has established a national database of postgraduate theses in education to support cumulative knowledge-building. The New Zealand Educational Theses Database also enables better access to the work of those educators and school leaders who have used postgraduate research opportunities to address problems of practice.

From the outset of the BES development, the researchers who are contracted to be the lead writers of the best evidence syntheses undertake to continue disseminating and developing their findings in the service

of educational improvement (Ozga, Seddon, & Popkewitz, 2006), and are given license to use crown (government) copyright in their own scholarship. A wide range of such publications by BES writers contribute to scholarship and knowledge resources for professionals about the use of evidence of what works for improvement. Examples are: Māori educational leadership and learning and inquiry in Māori-medium education (Hohepa, 2008; Hohepa & Robinson, 2010); evidence-based strategies for secondary mathematics teaching (Anthony & McChesney, 2009); student-centred leadership (Robinson, 2011; Robinson, Bendikson & Hattie, 2011; Robinson, Rowe, & Lloyd, 2008); realising the potential of professional learning (Timperley, 2011; 2011, October; Timperley & Alton-Lee, 2008); and collaborative inquiry for improving teaching and learning (Sinnema, Sewell, & Milligan, 2011).

Lead BES writers have built upon the BES findings through their teaching and research in new research centres: the Massey University Centre of Excellence for Research in Mathematics Education and the University of Auckland Centre for Educational Leadership.

The BESs also make explicit gaps in the available evidence that need to be addressed to guide improvement in education, with the goal that such gaps may be given some priority in future research agendas.

Summaries of Best Evidence Syntheses

Teacher unions and principals' groups requested easily accessible summaries of the best evidence syntheses. There are risks in creating summaries of bodies of evidence disconnected from source syntheses. For example, high-level summaries can:

- give a misleading sense that educational improvement is not complex;
- lead to over-assimilation as readers dismiss the high level findings with an 'I already do that' response; and/ or
- support 'magical' policy thinking about change – that information alone (to know) is sufficient to activate improvement.

For these reasons, the process used to generate summaries of the best evidence syntheses has involved careful formative quality assurance and their function is seen as an aide memoire to complement in-depth knowledge-building and use in local contexts informed by the source BESs and featured research and development.

The Iterative Best Evidence Synthesis Programme has worked with lead writers to prepare three BES summaries for the International Academy of Education and the International Bureau of Education's *Educational Practice Series*. These are available online⁵ in English and te reo Māori on the UNESCO website (Anthony & Walshaw, 2009; 2010; Sinnema & Aitken, forthcoming; Timperley, 2008; 2009).

Timperley's (2009) *Teacher professional learning and development* BES summary has been translated into six languages and a new European iteration of that BES that incorporates outcomes-linked studies reported in European languages has been published in Belgium (Denis et al., 2009, 2010).

In late 2011, New Zealand teacher, Zain Thompson, explained how, after in-depth professional development in a high-impact pedagogy, he used Anthony and Walshaw's (2008) summary of ten findings from the *Effective pedagogy in mathematics* BES as a daily checklist for ongoing reflection on his own practice, as well as a point of entry back into the larger synthesis.

In the last year, I have been using this booklet and the original Effective pedagogy in mathematics/pāngarau BES. I think it is fantastic and I make sure 'Am I doing this?', 'How does it relate to my practice?' So I keep up my professional development. (Thompson, 2011, DVD)

Coherence in Educational Improvement

Now that a series of best evidence syntheses and summaries has been generated, there is emerging congruence in the high-level messages drawn from the findings. While academic knowledge is traditionally organised within areas of specialisation, the knowledge needed for ongoing educational improvement requires more.

What works: Four major areas of influence for accelerated improvement

Across our best evidence syntheses it is apparent that four major areas of influence need to be activated effectively for accelerated improvement that works for diverse (all) learners (see Figure 1).

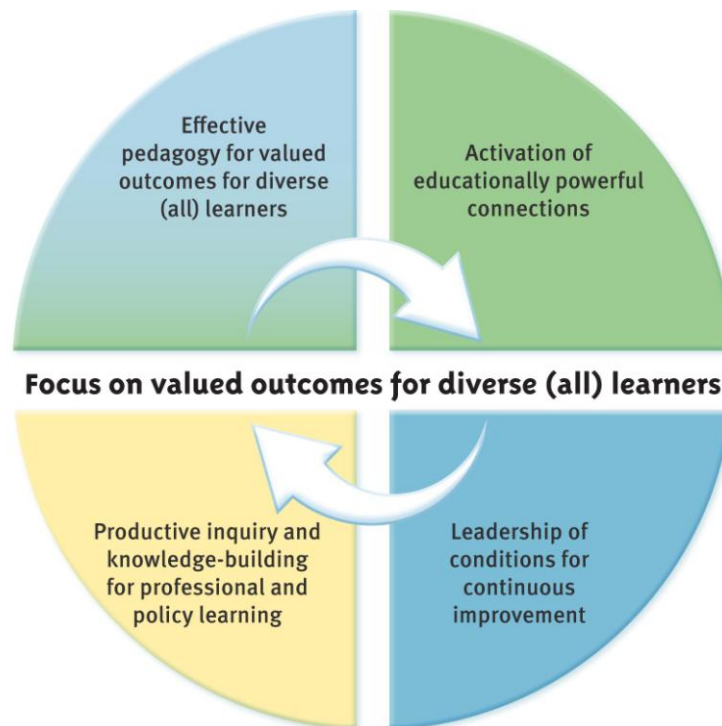


Figure 1: Four major areas of influence for accelerated improvement in education

To know about effective teaching but not about the nature and conditions of effective professional learning that makes such teaching possible is not enough. To know about what works in educational leadership but not about the ways in which such leadership can leverage deep improvements in pedagogical practice across a school is not enough. To understand teaching, professional learning, and leadership without activating educationally powerful connections with the lives, identities, families and communities of diverse (all) learners will not be enough; rather, such knowledge may perpetuate

inequitable practices in education. Early feedback from leaders and teachers is that they are seeking support to see connections across the evidence about effective teaching, professional learning and development, and leadership. An overview of high-level BES findings that illustrates how the findings are aligned across the syntheses is provided in Table 1 (over).

In interpreting the table, it is important to consider the sets of findings as representing interrelated bodies of knowledge and to refer back to the underpinning bodies of evidence and exemplars that explain what these findings do and do not mean in practice. For example, the ‘assessment for learning’ finding is about the way in which assessment is used to improve teaching *and* the way in which assessment for learning is integrated into the other dimensions of quality teaching. Datnow (2012) highlights the risks when a data-driven approach leads to preoccupation with testing and test data that does not leverage ongoing improvements in teaching. Hattie (2009) highlights the potential for harm when assessment results in labelling of students. In his synthesis of over 800 meta-analyses, he found the highest effect size for any influence to occur for student self-report on grades ($d = 1.44$). Underachieving students’ expectations and future achievement can be constrained by their knowledge of their own history of low achievement on classroom assessments. The label is taken on as part of the student’s identity.

What makes a bigger difference?

In considering the findings, it is also important to remember that quantitative analyses informed the high-level messages. For example, the highest effect size ($d = 0.84$) for any category of leadership activities linked to improved student outcomes (both directly and indirectly) was found for leadership activities that involved promoting and/or participating in teacher professional learning and development (Robinson, Rowe, & Lloyd, 2008; Robinson, Hohepa, & Lloyd, 2009). This was more than twice the effect size for any other leadership activity. This finding has implications not only at the level of an individual school. Rather, the finding situates effective professional learning as a critical factor in leveraging systemic improvement.

Table 1. Overview of high-level findings from five best evidence syntheses focused on effective leadership, professional learning, and teaching

School Leadership and Student Outcomes	Teacher Professional Learning and Development	Quality Teaching for Diverse (All) Learners
Establish goals and expectations	Focus on valued student outcomes	Focus on valued student outcomes
Promote and participate in teacher learning and development	Engage knowledgeable expertise external to participating teachers to challenge assumptions and develop new knowledge and skills	Use knowledge, evidence, and inquiry to improve teaching
Resource strategically	Use context-specific approaches to develop teacher knowledge, skills, and adaptive expertise in high-impact pedagogies	
Select, develop, and use smart tools	Select, develop, and use smart tools	Select, develop, and use smart tools and worthwhile tasks
Ensure administrative decisions are informed by knowledge about effective pedagogy	Arrange multiple opportunities for teachers to learn and apply information Integrate theory and practice to enable deep change	Ensure effective and sufficient opportunities for all students to learn
Build relational trust Ensure an orderly and supportive environment	Create conditions of trust and challenge Provide teachers with opportunities to process new learning with others	Develop caring, collaborative learning communities that are inclusive of diverse (all) learners
Create educationally powerful connections	Enable teachers to activate educationally powerful connections	Activate educationally powerful connections to learners' knowledge, experiences, and identities
Plan, coordinate, and evaluate teaching and the curriculum	Ensure active involvement of wider school-based leadership in leading, organising, and participating in learning opportunities	Scaffold learning and provide appropriate feed forward and feedback on learning
Engage in constructive problem talk Engage in open-to-learning conversations	Develop approaches that are responsive to teachers' learning processes and do not bypass teachers' existing theories	Be responsive to all students' learning, identities, and well-being
Analyse and solve complex problems	Maintain momentum through self-regulated inquiry	Promote thoughtful learning strategies, thoughtful discourse, and student self-regulation
Plan, co-ordinate, and evaluate teaching and the curriculum	Use assessment for professional inquiry	Use assessment for learning
Use a collaborative, inquiry and knowledge-building approach, aligning conditions within and beyond the classroom to optimise valued outcomes for diverse (all) learners		

The new finding about the impact of leadership leverage of effective professional learning and development reinforced Dr Lorna Earl's⁶ view of the potential significance for educational improvement of the BES Programme findings:

Over the past several decades the focus on educational change has been pervasive and unrelenting as education systems everywhere have struggled to meet the needs of the times. For those of us who have a long history of involvement in education, it is sometimes hard to imagine that there could be anything new under the educational reform sun, as old ideas are recycled and the pace of change often seems painfully slow. But periodically, something surfaces that has the power to fundamentally reshape how we work. The Iterative Best Evidence Synthesis Programme, of which this BES is part, has this potential.

(Dr Lorna Earl, President of the International Congress for School Effectiveness and Improvement, International foreword in Timperley et al., 2008, p. vii)

What is sufficient for improvement to occur?

The BES findings that informed Table 1 also provided analyses of what is sufficient for change to occur. The findings from the *School leadership and student outcomes BES* revealed relational trust to be critical to the success of improvement efforts and unpacked the ways in which such trust is earned.

Teacher professional learning that made a substantive difference for the learners of the participating teachers generally took one to two years (Timperley et al., 2008). Cost-cutting in times of fiscal crisis may be inefficient if investment decisions waste time and effort through funding interventions in ways that do not enable the conditions for sufficiency to be met. Overloading schools with interventions that are insufficient to enable deep change may risk goal-displacement in what is already working without further benefit.

What does not work?

The BES analyses also identify what does not work in education. Just because an approach is research-based does not mean it is trustworthy from an improvement perspective. For example, bodies of research have advocated 'learning styles' matching but outcomes-linked research has shown this approach to have negative effects⁷ (Alton-Lee, 2003; Irvine & York, 1995). In New Zealand, the outcomes have been found to be negative for Māori and Pasifika learners, particularly in mathematics, when teachers focus on providing kinaesthetic experiences for these students at the expense of other opportunities.

There is evidence of both policy workers and researchers engaging in improvement efforts that are counter-productive. The *School leadership and student outcomes BES* analyses revealed that when leaders were not able to protect teachers' focus on teaching and learning from the intrusions of officials, achievement declined (Robinson et al., 2009). 'To know' may not be enough but it does matter. Moving too quickly to bring external agents to close a knowing-doing gap (Pfeffer & Sutton, 2000) without sufficient knowledge creates risks for improvement efforts.

The analyses for the *Teacher professional learning and development BES* revealed instances of interventions where researchers provided professional development that led to deterioration in student achievement (Timperley, 2008). That BES also provided powerful advice for value for investment. Much time and resource can be invested that does not result in improvements for the students of participating teachers. There was recurrent evidence that professional development that bypassed rather than engaging with teachers' existing theories and beliefs was ineffectual.

Inquiry and Knowledge-building for Systemic Improvement

The BES Programme has developed an inquiry and knowledge-building approach to the use of the new evidence to support the goal of ongoing system improvement. A tool has been developed to support professional leaders and teachers in using change processes that are responsive to their own contexts, their own learning needs, and the needs of the diverse (all) learners that they teach (see Figure 2.)

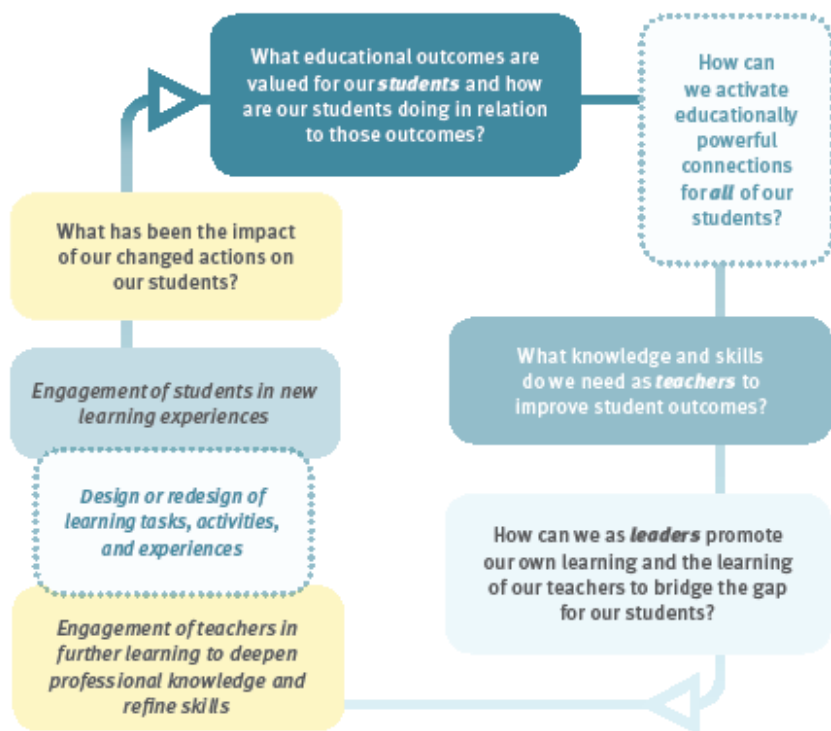


Figure 2. Professional inquiry and knowledge-building cycle to promote valued outcomes for diverse (all) learners

The tool shown in Figure 2 assists professional leaders and teachers to use formative evaluation to strengthen their practice. Hattie (2009) found formative evaluation approaches to have more impact on strengthening teaching than any other teaching influence ($d = 0.90$). The high-performing Finnish education system provides pre-service primary school teachers with postgraduate training in action research (Nieme, 2006), an approach that orients teachers to take an ongoing inquiry and knowledge-building approach to their practice.

In New Zealand, use of the knowledge-building and inquiry tool was critical to success in the Literacy Professional Development Project. This high-impact literacy intervention brought about the equivalent of two year's progress in one year for students (in relation to previous achievement gains), with an extra

three to four years of equivalent progress for every one year of schooling for the lowest 20% per cent of achievers (English & Baretta, 2006; Timperley, 2011; Timperley, et al, 2008). In that project, the ‘inquiry and knowledge-building approach’ was enacted through a chain of influence that engaged policy and project leaders and professional development facilitators, as well as school leaders and teachers, in an iterative inquiry and knowledge-building approach to accelerated improvement (Timperley & Parr, 2009; Dreaver, 2009). An iteration of this tool has also been reported to lift achievement within a spiral inquiry approach taken in a Canadian improvement project (Halbert, Kaser, & Koehn, 2011).

Using an inquiry and knowledge-building approach across a system is necessary to leverage what works and to create an environment where disciplined innovation is business-as-usual.

Such an inquiry approach needs to ensure targeted attention to the needs of underserved or disadvantaged learners. In response to teacher feedback, this latest iteration of the inquiry and knowledge-building tool focuses early attention on the need to activate educationally powerful connections for diverse (all) learners. By explicitly asking this question at the outset of a new planning cycle, teachers and leaders may be cued to make different decisions about the kind of professional learning needs they have. The failure to activate such connections is an area of system weakness in New Zealand (and other jurisdictions) with wide disparities in monitoring data. Targeted focus on underserved learners needs to be an integral focus of improvement efforts (Bishop, O’Sullivan, & Berryman, 2010).

The aim for the knowledge-building and inquiry tool is that it will be a catalyst for support to teachers to try approaches featured in BESs as making a bigger difference for diverse (all) learners. Without such a knowledge-building orientation, professional ‘inquiry’ could be time-consuming without leveraging the *what works* knowledge.

This BES tool has been incorporated into other policy work to enable national access. The original version of this diagram – the *Teaching as Inquiry* tool developed by best evidence synthesis writers – was simplified and included in a section focused on pedagogy in new national curriculum documents in 2007 and 2008 (Sinnema & Aitken, 2011). In a national evaluation of early implementation of the new curriculum, Sinnema (2011) found that educators across the system were receptive to, and positive about, the teaching as inquiry model. The evaluation found statistically significant albeit limited shifts in practice between 2008 and 2009 in the implementation of teaching as inquiry practices.

It is important when evaluating progress to avoid magical thinking about the role of policy documents alone. Sinnema and Aitken (2011) identified confusions in understandings about the ‘teaching as inquiry’ model in the curriculum. Thirty-three percent of responses confused teaching as inquiry with minimally guided or a pure discovery form of ‘inquiry learning’ by students; an approach found to be ineffective across the best evidence syntheses. Without in-depth support for professional learning around the use of such tools, it is unsurprising that new ideas and tools will be over-assimilated back into teachers’ existing knowledge and understandings.

A year after Sinnema’s evaluation, the national agency for reviewing schools in New Zealand (Education Review Office, 2011) reported findings from a national sample of 109 schools that indicated improvement:

In 72 percent of the schools in ERO’s evaluation, processes had been put in place by school leaders that were either highly, or somewhat informative and supportive in promoting teaching as inquiry. Leaders had created routines and protocols that facilitated discussion about student achievement and teaching practice. Systems were developed by them so that inquiry also became part of teachers’ classroom practice. In schools where teaching as inquiry was well supported, a culture was created that was characterised by shared aspirations to improve learning and teaching, and a desire to work as a team. (pp. 2–3)

Ongoing systemic improvement requires professional learning facilitators, project leaders, officials, and policy makers to engage in inquiry and knowledge-building in similar and inter-connected ways. By beginning the cycle with a clear focus on valued outcomes and areas of need apparent in monitoring data, all of those involved in improvement efforts can make informed decisions about where best to invest resources and time to advance improvement.

Cumulative knowledge-building and inquiry are needed in education to counter the tendency to ‘rediscover the wheel’, to avoid the traps of unfruitful fads, and to ensure that ongoing improvement efforts do translate into gains for learners.

Progress on Educational Improvement at a Systemic Level

An early set of BESs focused on quality teaching for diverse (all) learners in schooling and quality teaching, professional learning in early childhood education, and family and community influences on educational outcomes were developed from 2002 and made available online.

The early focus on family and community influences was designed partly to ensure ongoing policy attention to evidence of those socio-economic, health, safety, media, and other factors that need proactive policy action beyond the school (Biddulph et al., 2003)⁸. Closing the achievement gap requires children's basic needs to be met. For example, hearing loss arising from early untreated 'glue ear' has been prevalent in New Zealand and is linked to lower achievement, behavioural problems, and longitudinal effects such as lower earnings and higher incarceration rates. Available New Zealand data show one in every 15 new entrant children to have failed new entrant hearing tests (Ministry of Education, 2011). The rate for Pasifika was far higher with one in every eight new entrants failing hearing tests. The McKinsey⁹ report highlights free school meals for under-nourished children as a pre-requisite for educational improvement (Mourshed, Chijioko, & Barber, 2010).

The national guidelines for BES development were generated in consultation with stakeholders in 2004 and the innovation was formally established within its national policy organisation in mid-2005, with the first of the new best evidence syntheses published in 2007.

An initial challenge has been getting practical access to the BESs for educators. While stakeholder representatives have developed strong ownership of the BESs, the challenge is to enable access to these documents across a disparate self-managing education system in New Zealand. Stakeholder organisations have requested and lobbied for multiple hard copies of every BES to be made available to schools, rather than online provision only, because of the ways in which they use the documents in planning, meetings, and for reference. For organisational reasons, decisions were taken to print and make the BESs available in hard copy upon request but only two of four best evidence syntheses (those focused on effective leadership and professional learning and development) have been distributed to all schools. The outcome has been no proactive wide distribution to date of hard copies of the teaching BESs to schools; arguably the most critical knowledge resource for educational improvement given the evidence about the impact of teaching.

Stakeholder demand

Despite the issues with access, stakeholder demand from willing users has been considerable, requiring multiple reprints. Within a system of 2559 schools and around 52,000 teachers, principals, and other staff, individuals have requested over 18,000 hard copies of a synthesis about effective teaching in mathematics (published in 2007) and over 9000 hard copies of a synthesis about effective teaching in the social sciences (published in 2008). Several university post-graduate and pre-service professional education courses now use the best evidence syntheses as texts.

A national evaluation of curriculum implementation revealed that by 2009 teachers and principals valued the best evidence syntheses highly as the most useful of all resources available to them to advance curriculum goals in practice (Sinnema, 2011). At the time of the survey in 2009, 51 per cent of the primary sample and 49 per cent of the secondary sample of teachers and principals had engaged with a best evidence synthesis. Those in leadership roles had referred to a BES more frequently than teachers. Slightly more than half of the principal respondents and other leadership team members (58%) had used a BES more than three times.

It is likely that there has been more widespread use of the BESs since November 2009 when the *School leadership and student outcomes: Identifying what works and why best evidence synthesis* was launched and distributed to all New Zealand schools. This BES informed ‘Kiwi Leadership’ and ‘Professional Leadership’ policy frameworks for successive governments and was strongly endorsed by 17 national stakeholder organisations or groups. New Zealand school leader representatives have found this BES to be a useful tool in their ongoing work:

The Leadership BES already has significant traction in New Zealand secondary schools and is well regarded by the profession as being both aspirational and practical in content. We are proud to have been involved with it from the beginning and commend it to you as a well-researched, clear and detailed way forward for leaders at any level of the schooling system. We hope it gives principals in particular a focus for their work as well as being a useful tool to help us all find ways to improve student outcomes.

(Julia Davidson, President of the New Zealand Secondary Principals’ Association, 2011. *Making a bigger difference*, Iterative Best Evidence Synthesis Programme introductory flyer, p.4)

A recent OECD country review (Nusche, Laveault, McBeath, & Santiago, 2012) came to the view that:

The principle of evidence-based policy making is well established in New Zealand. At the national level there is a strong commitment to bringing together national and international evidence on the factors and

practices that can contribute to improving teaching and learning. Representatives of several stakeholder groups commended the willingness of the national level to engage academic expertise to build an evidence-based body of knowledge on effective practice.

The most prominent example is the Ministry of Education's Iterative Best Evidence Synthesis (BES) Programme, which brings together research on school factors that have a positive effect on student learning. The publications appear to be widely used by both policy makers and stakeholder groups to inform education policy and practice in New Zealand. (p. 30)

The Iterative BES Programme benchmark for success

In terms of its own benchmark of an unwavering focus on leveraging improvements in valued outcomes for diverse (all) learners, the work of the Iterative Best Evidence Synthesis Programme will not have succeeded until national change data on both cognitive skills and social outcomes show trends for ongoing improvement across primary and secondary schooling, particularly for Māori and Pasifika students, with accelerated gains for students who have been underserved or disadvantaged. Across the BESs, highly effective approaches particularly accelerate progress for learners with special needs; so progress on use of this evidence would be reflected in such acceleration (Alton-Lee, 2003; Timperley et al., 2008).

System performance: New Zealand schooling

New Zealand's relatively high performance on PISA assessments, especially given comparative per student investment, shows a nation whose education system is high-performing for many students who are retained in school (OECD, 2011).

Secondary schools have progressively lifted the proportion of students attaining the senior secondary qualification, New Zealand Certificate of Educational Attainment Level 2. Change data shows a gain from 57 per cent of students attaining NCEA level 2 in 2005 to 75 per cent of students doing so in 2010. However, a more inclusive methodology for tracking attainment of school leavers (including those in alternative education, those transferring between schools, and those who left school early aged 15 years) showed 69% of New Zealand students to be attaining NCEA Level 2 or above by 2010 (Ministry of Education, 2012).

Primary level assessments show more students performing at or below the lowest international benchmarks than the international average, and New Zealand primary mathematics achievement is

below the international average (Caygill & Kirkham, 2008; Chamberlain, 2007; Mullis et al., 2007). Primary science achievement has deteriorated (Mullis et al., 2007). Māori and Pasifika learners are over-represented amongst students not achieving the low international benchmark in mathematics. There was a marked deterioration in performance of middle primary Pasifika students as the proportion of Pasifika *not* reaching the low international benchmark in mathematics grew from 23 per cent in 2002 to 38 per cent in 2006 (Alton-Lee, 2011; Caygill & Kirkham, 2008). Recently, New Zealand was found to be least able to mitigate the effects of low socio-economic status on student reading achievement in a survey of 65 countries (PISA, 2010).

The data from the Trends in International Mathematics and Science Study uses a self-report index for safety in the peer culture that includes items such as being made fun of, called names, being excluded, being hurt, and having something stolen (Mullis et al., 2007). New Zealand was found to have the second-lowest rating for student safety out of the 35 participating countries. New Zealand youth suicide rates were second-highest of 13 countries, with exceptionally high rates for adolescent Māori boys (Ministry of Social Development, 2011).

On McKinsey's criteria for identifying improving school systems internationally, New Zealand's performance on international assessments over time showed it not to be an improving system (Mourshed, Chijioke, & Barber, 2010). New Zealand schooling was judged to be in some stasis and on the cusp of 'fair to good' compared with other systems on the McKinsey 'universal scale'. The McKinsey improvement trajectories ranged from 'poor to fair', 'fair to good', 'good to great', and 'great to excellent'.

Use of BES in policy

Use of the *what works* evidence to inform policy and implementation has been variable, and other priorities have prevailed. The original innovation was designed to inform policy work in 'medium-term strategy', but its mandate was contested and inherent tensions arose as the findings of the programme were in conflict with existing policies, perspectives, approaches, and programmes. The Iterative Best Evidence Synthesis Programme was resituated as part of the Ministry of Education's 'information and analysis' function. An early pilot study of the use of BES findings within the Ministry coupled with a review of research about the use of evidence to inform policy were commissioned and quality-assured by Dr Lorna Earl to provide constructive proposals to inform organisational strategy (Moore, 2006), but

alternative approaches took precedence. BES work took a catalyst function where possible and created affordances for improvement with willing users.

Implementation of the findings of the new syntheses has depended on piggy-backing on opportunities for implementation or championship of, and partnership with, others with policy influence. A formal review of the Ministry of Education concluded: “More use could be made of this evidence for policy development and to gain traction within the sector” (State Services Commission et al., 2011, p. 8).

There is a risk of magical thinking that, having generated a resource of trustworthy evidence, the knowledge and use of that evidence will naturally follow (Alton-Lee, 2011). Coburn, Touré, & Yamashita (2009) carried out research into how evidence is used in decision-making in one educational bureaucracy in the United States and found:

- a strong tendency to discount evidence when it does not support the beliefs decision-makers hold;
- orchestrated consensus to over-ride action on the available evidence; and
- the extent of use of evidence depends upon individuals with positional authority.

‘Evidence’ brought to the resolution of disputes “rarely addressed assumptions about high quality instruction or about how children learn” (p. 1127). The pedagogical knowledge of decision-makers was significant. In times of decision-making under pressure and/ or contracting resources “decision-making trajectories became more interrupted” (p. 1140), last-minute, and symbolic. By ‘symbolic’ these researchers meant the use of evidence to give legitimacy to their position rather than to specifically guide improvement efforts.

A new literature is emerging about the use of research evidence to inform policy decisions. Drawing upon the reports of constituencies across the European Community, Gough et al. (2011) call for more attention to systems and processes for using evidence to inform education policy-making that does serve the public good.

Barriers to the use of compelling evidence for improvement should not be under-estimated. Slavin (2010) identifies the long-standing failure of educational policy internationally to accelerate improvement through a teaching approach that (done well) accelerates academic achievement for diverse (all) learners, counters bullying, and develops social skills and social capital:

In comparison with schooling practices that are often supported by governments – such as tutoring, technology use and school restructuring – co-operative learning is relatively inexpensive and easily

adopted. Yet, thirty years after much of the foundational research was completed, it remains at the edge of school policy. This does not have to remain the case: as governments come to support the larger concept of evidence-based reform, the strong evidence base for co-operative learning may lead to a greater focus on this set of approaches at the core of instructional practice. In the learning environments of the 21st century, co-operative learning should play a central role. (p. 174)

The best evidence synthesis findings themselves explain the kinds of conditions that enable deep change to occur. Professors Ben Levin and Michael Fullan, formative quality assurers for the *School leadership and student outcomes BES*, have warned that BES as an innovation will not achieve its purposes for educational improvement unless there is more systematic use of the findings to inform policy and policy implementation:

The BES report on leadership will be for nought unless there is a concerted plan to develop the core capacities of effective leadership in all New Zealand schools. ... It would mean taking a concrete problem (such as raising the bar and closing the gap in literacy in all New Zealand schools) and incorporating the key leadership capacities into the implementation of that plan. ... We urge all readers to take active steps to ensure that the full value of this great report is realised.

(Professors Ben Levin & Michael Fullan. International foreword in Robinson et al., 2009, pp. 14–15)

Scaling Up Educational Improvement

BES provides *what works* evidence and explanatory principles to be used to develop core capacities for improvement *across* the system. The BES Programme theory of action is that improvement will be more rapidly advanced if capability-building across a system is supported through scaling up, spreading and developing adaptive expertise in highly effective approaches.

Since the early BES work in 2002, policy advice has been advanced on the need for effective implementation and scale-up of high-impact interventions in areas of national need. In 2012 the Ministry of Education is progressing action for the first major national scale-up in schools (across low-socio-economic status communities) of Reading Together, an intervention featured in the best evidence syntheses. Reading Together is a four workshop intervention with parents or caregivers that develops a relationship with a local community or school librarian, assists parents to effectively support their children's reading development at home, strengthens parent-child relationships (Biddulph, 1983; 2004; Robinson et al., 2009), and provides meaningful ongoing access to books for children and young people who would not otherwise have such access. International assessments of reading literacy continue to show 'numbers of books in home' is one of the most powerful predictors of high reading achievement (Biddulph et al., 2003; Chamberlain, 2007).

This intervention matters for New Zealand because of:

- poor performance in mitigating the effects of low socio-economic status of students' families on reading achievement; and
- an ongoing negative effect of parent 'help with' (rather than 'support for') reading, as well-intentioned parents inadvertently pressure and criticise their children (Robinson et al., 2009).

As New Zealand primary schools report student progress against new National Standards in literacy, all parents, but particularly parents of children who are achieving below the National Standards, need effective assistance to support their children in ways that realise the intention of the standards policy to advance improvement. Without such intervention, there are risks of unintended negative outcomes.

The potential of Reading Together is remarkable. The equivalent of a year's achievement progress can be achieved through a five-hour intervention with an upward trajectory for longitudinal achievement. However, evidence to date of effective replication is variable. Some schools supported by the original

researcher have continued the momentum until the intervention has become highly effective business-as-usual school practice over many years. Others have found it difficult to gain parent trust.

Success will depend upon the *how* of implementation and the expertise leveraged to support capability-building. The *School leadership and student outcomes BES* highlighted the cost effectiveness of the Reading Together programme. A replication of the original study, commissioned to inform that BES, shows how proactive and knowledgeable leadership by the principal and other senior leaders is critical to creating the high-trust environment and alignment needed for success (Biddulph, 2004; Robinson et al., 2009; Tuck et al., 2006). Other critical factors include:

- effective support and capability-building for the workshop leaders and local librarians;
- the approach taken to build trust with, support, and learn from, diverse parent communities;
- how communities manage the practicalities of access for some parents and caregivers, including transport and care for other children;
- the extent of understanding and engagement of other school staff so that what is happening in the in-school literacy programmes is aligned to support and leverage the intervention and new relationships; and
- proactive responsiveness to the implications of a rapidly changing digital literacy environment.

In her landmark paper about the failure of much educational reform, Coburn (2003) explained that four inter-related dimensions are critical to deep and lasting change when scaling up reform: depth, spread, shift in reform ownership, and sustainability. Drawing upon research and development that informed the scale up of Te Kotahitanga, an intervention to accelerate improvement for Māori secondary students in New Zealand, Bishop, O'Sullivan, and Berryman (2010) advise extending Coburn's framework to explicitly address goal setting (with targeted attention to reducing disparities), pedagogy, institutional change, leadership, and the use of evidence, as drivers of effectiveness to scale.

High-impact Approaches: BES Exemplars for Knowledge Mobilisation

Like many other scholars writing about educational change, Coburn (2003) talks of a history of scale-up that is “replete with evidence of reforms that barely scratched the surface of schooling, failing to reach into the classroom to influence instruction” (p. 4). This is perhaps the greatest challenge for educational improvement. In New Zealand, the Education Review Office (2011) found that in the use of the ‘teaching as inquiry’ model:

Few schools used research findings as the basis for their decision-making about provision for students. Teachers typically selected further teaching strategies from an existing repertoire of their own and colleagues’ practice. (p. 29)

There is compelling evidence of pedagogies that are highly effective for diverse (all) learners simultaneously. But such pedagogies have the potential to accelerate improvement only if they become part of teachers’ repertoires – and are informed by deep pedagogical understanding and adaptive expertise across schooling.

Identifying and understanding high-impact pedagogies

Through investigating thousands of studies, the best evidence synthesis work is progressively identifying high-impact pedagogies and approaches. Such high-impact approaches are not a fluke of luck. They arise out of disciplined innovations that have leveraged ‘what works’ knowledge from a range of research evidence, often from across all four areas of major leverage: valued outcomes for diverse (all) learners pedagogy, educationally powerful connections, professional learning, and leadership.

High impact is achieved through intensive improvement work that builds upon successive cycles of collaborative research and development (R & D) involving researchers and practitioners in developing expertise and refining approaches in context. Such approaches demonstrably close the knowing–doing gap that has beset the use of ‘what works’ evidence in education (Fullan, 2011).

Creating BES Exemplars

Through intensive consultation with teachers, middle leaders, principals, researchers, and policy colleagues, we have generated the BES exemplars to feature high-impact pedagogies. The BES exemplars explain the *what*, *why*, and, in particular, the *how* of high-impact approaches. They are co-

authored with researchers who have developed and/or led local implementation of the approach. The exemplars are designed to be fit-for-purpose and to make the research evidence accessible in forms useful for practitioners.

The search for BES exemplars gives priority to pedagogies that address areas of system need or weakness. Selection criteria give priority to three kinds of evidence:

- the magnitude of acceleration of progress for underserved or disadvantaged learners while optimising valued outcomes for diverse (all) learners in a class;
- the exemplification of findings across BESs; and
- the range of valued outcomes that the approach influences, giving priority to approaches that advance both academic and social outcomes.

The first four BES exemplars will be accessible online at <http://educationcounts.govt.nz/goto/BES> from April 2012 (Alton-Lee, Hunter, Sinnema, & Pulegatoa Diggins, 2012; Alton-Lee, Berryman, & Pulegatoa Diggins, 2012; Alton-Lee, Timperley, Parr, & Dreaver, 2012; Alton-Lee, Westera, & Pulegatoa Diggins, 2012). The BES exemplars will also enable a focus on high-impact pedagogies in curriculum areas for which full BES development has not been feasible to date.

Stakeholder advice and feedback

Teachers, principals, and middle leaders advised that they valued the original BES cases and wanted (what were to become the) BES exemplars¹⁰ developed rather than more general synthesis work. They valued the search for ways of working smarter for improvement. Stakeholders valued in particular seeing the work of practitioners (embedded in the research studies) being recognised and valued as a core resource for improvement. They wanted exemplars to feature even more teacher and student voice in BES work.

Teachers also wanted much more access to supporting resources within the new work, including trustworthy online supports. They wanted to see not only explanations of effective pedagogy but also of the professional learning and leadership supports that made accelerated progress possible. They wanted explicit guidance in ways of activating educationally powerful connections for diverse (all) learners and ways of leveraging community resources to create more equitable education. Stakeholders also gave

feedback that they wanted access to knowledgeable expertise and effective professional learning and leadership support at a systemic and local level to make these kinds of improvements practicable.

To support the fit-for-purpose approach to exemplar design, ‘think alouds’ were used in which teachers and school leaders revealed their thoughts as they first read draft exemplars, early iterations were offered to policy colleagues for comment, and extensive formative quality assurance was used. As a consequence, the professional inquiry and knowledge-building approach is built into the exemplars. The diagram (see Figure 2) has been incorporated into a ‘Professional learning: Starter questions’ tool to assist teachers and leaders in their reflections on whether and how they might use the high-impact approach featured.

The Ministry of Education library has made a new provision available to support educators in their use of the *what works* evidence. New Zealand educators seeking further detail about an approach can request access to any source article cited in an exemplar or BES. Previously teachers have not had access to a wide range of published research unless they enrolled in tertiary institution.

Each BES exemplar includes an ‘Implementation alerts’ checklist: what is and isn’t recommended for effective implementation. The checklist is prepared by a featured researcher on the basis of their knowledge, experience, and understanding of what works. Teachers and leaders have responded very favourably to these ‘Implementation alerts’, particularly when they recognise that some of their own experiences have been ‘lethal mutations’¹¹ of potentially high-impact pedagogies. The ‘Implementation alerts’ serve to counter magical thinking about improvement and avert over-assimilation of the research evidence into an ‘I already do that’ mindset.

The BES exemplars have an introductory section that makes transparent the priorities that they address for students, educators, and policy-makers. The BESs themselves provide evidence from hundreds of source studies. BES exemplars are designed to align focus and action across research, policy, and practice communities for accelerated system improvement that does achieve the pedagogical depth so many reforms have failed to progress.

In what follows, I describe the high-impact approaches featured in three of the new BES Exemplar series for which development is in progress.

Developing communities of mathematical inquiry

BES Exemplar 1 features a high-impact intervention to develop classroom learning communities in two classes in schools drawing upon the children of low socio-economic status communities. The (predominantly Māori and Pasifika) learners learned to engage with the teacher and each other in mathematical inquiry, reasoning, and argumentation. The exemplar traces the significant changes in teacher knowledge and pedagogy and in student behaviour in mathematical practices through a collaborative school-based professional learning process over one year. The effect sizes for this intervention were $d = 2.39$ and $d = 2.53$. No child who had been in these classes over the period of the intervention was attaining below the achievement level average for their age group by the end of the year. The practical effect of the intervention is that the students made four to five years of business-as-usual progress in one year. The approach teaches students how to engage in purposeful ‘friendly arguing’ about mathematical ideas to create a learning environment where it is safe to take intellectual risks. The anti-bullying effect such training accomplishes is compellingly illustrated by ten-year-old Wiremu’s directive to a classmate who has been disrespectful to a female peer working in their small group: ‘Don’t dis’ her, man, when she is taking a risk’.

This intervention was carried out as a doctoral study in which the expertise of the researcher as a teacher and teacher educator in mathematics education was critical (Hunter, 2007). Of particular significance in the development of this approach was the way in which the researcher drew upon her own cultural knowledge and Cook Islands Māori heritage to support the teachers to use trustworthy evidence to develop culturally responsive pedagogical practice.

The intervention was designed to draw upon the knowledge generated out of cycles of research and development work led out of Purdue University. For example, a smart tool that was used to scaffold change in this study was adapted from The Mathematics Communication and Participation Framework (Wood & McNeal, 2003). The approach was informed by Stanford University’s Complex Instruction pedagogy and the ongoing R & D that high-impact model has informed in different curriculum areas (Boaler, 2008; Cohen & Lotan, 1997). The approach drew upon and informed work in progress in the development of the *Effective pedagogy in mathematics/pāngarau BES*. The lead writer of that BES also led the R & D programme that made the doctoral research possible, and supervised the doctoral study. The intervention exemplified the findings of the summary of that BES and many of the findings of the *Teacher professional learning and development BES*. At the school level, this intervention addressed all

four major areas of influence required for accelerated improvement (valued outcomes for diverse (all) learners pedagogy, educationally powerful connections, professional learning, and leadership). The expertise of the research and developer who provided the professional learning was critical to its success.

Reciprocal teaching

BES Exemplar 4 features six high-impact New Zealand interventions using reciprocal teaching, a high-impact strategy for teaching reading comprehension. When well-implemented, reciprocal teaching develops student leadership, co-operation, and capability in the use of four metacognitive strategies to accelerate their own learning: clarifying, questioning, summarising, and predicting. The effect sizes for the achievement gains from these interventions were all large, even though the interventions occurred over a relatively short time period of from around 12 to 21 sessions. The original research and developers of reciprocal teaching collaborated to create an innovation to improve the teaching of reading (Palincsar & Brown, 1984). Their approach was guided by their goal for improvement, and to this end they drew upon many research fields, including behaviourism, applied research on memory, cognitive behaviour modification (verbalised self-instruction), socio-cultural theory, and research on literacy. Within the United States, successive cycles of collaborative R & D have followed over three decades. Most recently, the approach has been adapted to work in a digital environment. This has included the provision of an online resource to support teacher professional learning (Palincsar, 2007).

The exemplar of highly effective New Zealand interventions includes the use of reciprocal teaching with:

- primary students across high and low socio-economic status communities, with particular focus on accelerating the achievement of Pasifika students (Kelly, Moore, & Tuck, 1994; Gilroy & Moore, 1988);
- new immigrant students from Taiwan using alternate sessions of reciprocal teaching in Mandarin and English (Fung, Wilkinson, & Moore, 2003); and
- students with special needs using an audio-assisted variant of reciprocal teaching that accelerated progress (Le Fevre, Moore, & Wilkinson, 2003).

Two further studies provided compelling evidence of effectiveness in the use of reciprocal teaching with first year secondary school students (Smith, Timperley, & Francis, 2011; Westera, 2002).

Most interventions were designed and carried out by educators doing postgraduate research with supervisory support from staff at the University of Auckland. Westera's (2002) intervention focused on issues of sufficiency, revealing that six to eight sessions for students showed no gain, while 12 to 15 sessions produced effects far greater than business-as-usual gains from a year's teaching. She also focused on leadership, organisational change, professional learning, and affordances in the 'how' of effective intervention in a secondary school context; raising issues to be addressed in future R & D to optimise effectiveness.

The set of interventions in this exemplar variously illuminated all four major areas of influence on accelerated improvement (valued outcomes for diverse (all) learners pedagogy, educationally powerful connections, professional learning, and leadership). The intervention explicitly supports students to activate connections to their own experiences. The implementers' development of expertise ranged from intensive postgraduate training to school-based provision for selected teachers and training of teacher aides. However, with the exception of Westera, little detail was provided about the 'how' of the development of expertise or the involvement of school leadership.

Reciprocal teaching is a relatively brief, high-impact strategy that needs to be integrated into wider reading or secondary school programmes to support students in making meaning from text across the curriculum. It seems to be of particular value when used early in the school year to model norms of peer collaboration and build student capability in the pro-active use of metacognitive strategies to support their own learning.

Ripene Āwhina ki te Pānui Pukapuka (RĀPP)

Audio-assisted reading to support students' literacy in te reo Māori

This intervention involves using the knowledge and expertise of fluent speakers of te reo Māori (the indigenous language of New Zealand) to provide audio recordings of books in te reo Māori. Students are supported to select audio recordings of appropriate difficulty level and interest that they can read as many times as they like. As they listen, they follow the text carefully until they are able to read it independently. The innovation built on a range of research and development work carried out in New Zealand over the previous two decades. The effect sizes were very large across different sites, although the intervention took place over just two terms.

The approach has been developed for use by schools and by the families of students with carefully designed, responsive, and structured support for parent, teacher, and leader learning. Critical to the success of this intervention is the quality of the collaborative approach to the R & D and the priority given to relational trust in the change process. The research whānau (or ‘extended family’) leading this work involves researchers and respected elders who bring a range of academic, research, professional, policy, iwi, and cultural expertise to this deliberative R & D work.

This innovation has been designed to accelerate progress in a context of language revitalisation and an education system that under-serves indigenous students. Given limited access to the indigenous language across New Zealand schooling, just under 13 per cent of young Māori report proficiency in speaking te reo Māori by the end of their tertiary studies (Ministry of Education, 2012a). A legal claim against the nation’s founding Treaty of Waitangi (WAI 262) provides searing evidence of the need for urgent action by the New Zealand education system (Waitangi Tribunal, 2011). If supported by a deliberate strategy to grow adaptive expertise, this high-impact intervention has the capacity for rapid systemic improvement to counter a pattern of inaction by officials identified in WAI 262.

A series of interventions designed by the research whānau addressed all four major areas of influence required for accelerated improvement over different sites (valued outcomes for diverse (all) learners pedagogy, educationally powerful connections, professional learning, and leadership). The research whānau developed sufficient expertise in others to implement the professional learning support model (second order professional development) to leverage similar levels of accelerated progress to the original team. The exemplar features an adaptation of the approach to continue support for student learning by their families when their teacher became unavailable. In the introduction to BES Exemplar 2, Professor Sir Mason Durie (2011) identifies benefits of extending access to this approach not only for language revitalisation but also for building cultural integrity across the education system so that Māori can genuinely succeed as Māori. This exemplar may have significance for schooling systems seeking to better serve indigenous communities in other countries also.

Of particular significance for the wider international community is the innovative model used by Māori leadership in this research and development to leverage and align professional learning *and* family and community learning to accelerate achievement for students. Such an approach created much larger effects than other interventions in a meta-analysis of 37 studies and reviews focused on school–home connections (Robinson et al., 2009).

Making a Bigger Difference for Valued Outcomes for Diverse (All) Learners Matters

The interventions featured in these BES exemplars have all brought about the effect of several years accelerated improvement in academic achievement compared to the trajectory for business-as-usual. These interventions have also variously advanced social outcomes, countered bullying, developed student self-regulation, and promoted other valued outcomes for diverse (all) learners. All, including the mathematics intervention, have been found to accelerate progress on language skills.

Public good: Counter to harm in education

Over many decades there has been research evidence of the ways in which well-intended policies, business-as-usual teaching, and the ‘hidden curriculum’ can do harm in education. For example, such harm can arise from the ways in which task organisation and teaching approaches can exacerbate bullying, labelling, and exclusion (Bossert, 1979; Hattie, 2009; Rietveld, 2005); lived curriculum can be exclusive of and/or alienating of the cultures, identities, and languages of learners (Alton-Lee, Nuthall, & Patrick, 1995); and resources can be allocated in ways that exacerbate disadvantage through practices such as fixed ability grouping, streaming (tracking), grade repetition, and the allocation of least qualified teachers or teacher aides to work with the lowest achievers or students with special needs (for example, Brophy, 2006; Gamoran, 1992; Hattie, 2009; Rutherford, 2008).

There has been a longstanding principle in the health field of ‘first do no harm’ articulated through the Hippocratic Oath, but such a principle is not a given in education. Perhaps education is seen as inherently a public good. Research evidence linked to outcomes show that it can be otherwise. Grappling with such evidence is difficult because the effects are so often hidden and counter-intuitive to common sense or adult perception. Even ‘to know’ is a challenge.

When the New Zealand primary teachers’ union brought together a group of teachers to assist with BES work, many spoke of student racism as something they saw as in the past; not a reality of the present. I asked the teachers to consider the data on New Zealand’s second-lowest rating for student safety out of 35 countries and the analyses showing Māori boys and Pasifika students to be least safe. As the group grappled with the dissonance this new data created for them, a young teacher in the group spoke out about her own child, the child of a proud Māori father and Tongan mother. She described how, in 2009, her five-year-old son came home from his first week of school and asked his parents, “How can I make my skin white?”

In the case of educational policies, practices, and processes that inadvertently do harm, ‘to know’ is not enough. These bodies of evidence require action from policy-makers, leaders, researchers, and practitioners. For New Zealand, with its slow progress in normalising the use of te reo Māori in its education system, exceptionally high rates of peer bullying, and high youth suicide rates, informed action is urgently needed. But knowing what does not work is not enough. Telling teachers to stop using harmful or inequitable practices will likely be ineffectual. Teachers need to be supported through effective professional learning to use alternative practices that are positive, high-impact, and practical. High-impact pedagogies such as those identified in the BES exemplars provide an effective way of responding to the ‘first do no harm’ imperative. Hunter’s approach with mixed ability groups, for example, creates learning communities in which the students themselves learn to exercise zero tolerance for bullying – through core mathematics teaching.

Public good: Economic growth and societal well-being

In the 2008 Distinguished Lecture of the American Educational Research Association, Professor Henry Levin revealed how improving educational justice improves other valued outcomes such as health and lower criminal activity, providing returns to taxpayers that exceed the costs (Levin, 2008). As the world grapples with continuing financial crises, it is timely to highlight the evidence that what happens in education can have powerful effects on economic growth (Hanushek, Machin, & Woessman, 2011). Hanushek and colleagues investigated the relationship between educational outcomes and individual benefits, as well as a nation’s economic growth, using student achievement in mathematics and science in international studies:

This paper reviews the role of cognitive skills in promoting economic well-being, with a particular focus on the role of school quality and quantity. It concludes that there is strong evidence that the cognitive skills of the population—rather than mere school attainment—are powerfully related to individual earnings, to the distribution of income, and to economic growth.

(Hanushek & Woessman, 2008, p.607)

Economic growth flows only from reforms that bring actual improvements in cognitive skills.

(Hanushek, Jamison, Jamison, & Woessman, 2008, p.70)

Hanushek, Jamison, et al. (2008) found that closing gaps and optimising education for all, including the highest achievers, matters for economic growth. Wilkinson and Pickett (2010) found nations that are more egalitarian in income distribution and educational outcomes create higher living standards and better social environments for all.

An analysis of the economic costs of wide disparities in educational outcomes indicates that they impose a cost to a nation that has the effect of a permanent recession (Byron et al., 2010). Given the costs to children and young people and the costs to nations, there is too much at stake not to leverage our knowledge of what makes a bigger difference in education and wider economic and social policy.

The *what makes a bigger difference* evidence is a resource for countering educational inequality. Levin (2009) explains, “We have learned that while changing classroom practice is difficult, and by itself will not be enough, significant improvements in outcomes for poor children cannot occur unless there is a change in teaching and learning practices ... if schools are a prime agency for addressing inequalities then that is where additional energy and money should go” (p. 184, 191).

Public good: Value for investment in times of fiscal and economic crisis

The evidence of economic returns from educational improvement signals the importance of investing in high-impact interventions in fiscally constrained times. Comparative evidence about what makes a bigger difference for valued outcomes for diverse (all) learners provides information about differences in magnitude of impact, range of effects, duration of intervention, and the resources involved that brought about the accelerated improvement (or not). The high-impact pedagogies can counter risks of inefficient add-on interventions (for example, anti-bullying programmes that overlay but do not counter persistent negative peer relationships shaped by classroom practices). Such information about effectiveness can inform value-for-money assessments for wise investment of resources and time and indicate where reprioritisation of resources could better serve students, teachers, and the public good.

The BES analyses leverage historical expenditure. In this paper, I have illustrated, for example, how substantial investment in high-impact R & D in the USA has been leveraged to be responsive to local needs in New Zealand.

Reprioritisation needs to consider the cost benefits of different kinds of investment in research. Costly policy investment in large scale one-off evaluations provided at the end of interventions by commercial providers may serve accountability purposes after the fact. But commissioned evaluations may not

realise the effectiveness and efficiency gains that formative evaluation enables through reflexive cycles of research and development. Accountability matters in the service, rather than at the expense, of improvement.

Effectiveness, efficiency, and innovation

Levin (2010) and others have explained the cost to educational improvement of a preoccupation with, and a poor track record of, innovation at the expense of effectiveness. He calls for an improvement agenda “in which we focus on wider use and application of what we already know to be effective. [His] argument is that we have considerable knowledge of this kind but it is not broadly applied and we are only just learning what it takes to change school practice on a widespread basis in ways that produce improved student outcomes” (p. 10).

High-impact approaches informed by collaborative research and development have the potential to leverage what works *and* drive disciplined innovation. Those genuinely ‘smart tools’ created, tested, and refined through collaborative R & D can enable such innovation to support pedagogical change to scale.

Fullan (2011) warns that while technology is important, “assuming that the wonders of the digital world will carry the day versus instruction” (p.5) is to lead with the wrong driver. Alternatively, if systems lead with the right lever – pedagogy – then investment in technology will be an ‘instructional-digital powerhouse’ for improvement. Leading with the right driver will avert expensive investment that does not leverage the outcomes sought.

Expertise matters

That expertise matters in education is not a given in public or policy or perhaps even researcher perception.

It is instructive to reflect on public and parents’ responses if the kinds of proposals that are regularly raised for quicker and cheaper ways to get teachers prepared for teaching were advanced for other professions, for example, for paediatric physicians and nurses. The twenty-first century has brought an uncertain perspective on the value of expertise with a focus variously on a ‘knowledge society’ and ‘just in time knowledge’, and markedly varying views on whether excellence in public policy requires any specialist expertise in the area of policy focus. In 2011, the Chief Science Advisor to the New Zealand

Prime Minister called for more attention to the appointment of knowledgeable expertise in policy organisations to better advance the use of evidence in policy formation (Gluckman, 2011).

Even though ‘to know’ is the core business of researchers, those with capability can remain invisible or unacknowledged, and the nature of expertise unspoken. Academic hierarchies and reward systems can be in tension with an improvement or applied research agenda, affording high status to ‘armchair’ critique, quantity of publications, recency, blue skies research, and theoretical originality, irrespective of usefulness or validity. Much research remains unconcerned with the validity of hypotheses about effectiveness in terms of impacts on diverse (all) learners, yet is influential in professional education. There needs to be a shift in the status that academia affords applied research and development, recognising:

- the theoretical complexity of such endeavours;
- the calibre of expertise required to collaborate to accelerate improvement in situ in areas of educational need; and
- the public good importance of high-impact R & D.

Often the *how* of improvement and the expertise that enabled improvements in practice are invisible in traditional research reports, where other concerns such as methodology become paramount. In following reporting conventions, for example, researchers can be silent about how their own knowledge, professional experience, and expertise mattered in what happened.

The names of the practitioners who worked with researchers to forge improvements are frequently invisible in the apparent interests of research ethics. Such invisibility may not advance professional ownership of ‘what works’ knowledge. In BES work with stakeholders, I have often needed to remind teachers and leaders that the evidence in the best evidence syntheses reflects the accomplishments of practitioners. The BES work is about making the expertise of educators visible and returning that knowledge to the profession.

The findings of the *School leadership and students outcomes BES* were clear that no one leader has access to all the knowledge, skills, and dispositions needed for improvement. Educational expertise and capabilities need to be accessed from within and outside of a school. Such is the case also in wider system improvement.

Collaborative R & D as a Driver for Accelerated System Improvement in Education

High-impact collaborative R & D is a form of activity that brings together the conditions for expertise to develop and grow. It does the tough job of building on understandings from a range of research fields in order to address complex educational problems in practice. Through collaboration, R & D bridges the research–practice divide, often involving educators who have used postgraduate studies or action research to solve problems of practice.

Through cycles of R & D, some projects have reported painstakingly on what they have learned about the optimal and necessary conditions for sufficiency for the smart tools they have developed and the professional learning they support to have translated into sustained improvements in practice (Bishop, O’Sullivan, & Berryman, 2010; Cohen & Lotan, 1997; Yamamoto, 2007).

Reprioritising to invest in high-impact R & D

In this paper I have identified public good and economic benefits that educational reform that is effectively leveraged to scale and actually improves cognitive skills affords. High-impact educational R & D delivers. But after reviewing expenditure on educational R & D across a small sample of countries, an OECD (2003) report identified the relatively low proportion of funding afforded to R & D in education and the challenges this raises for knowledge societies:

A rough estimate of the level of educational R & D as a percentage of total expenditure on education is on average less than 0.3% in six countries for which data are available. This is a very small figure when education is compared with other knowledge sectors, for example, the health sector where between 5–10% of the total health expenditure in public and private sectors are directed to R & D. (p.11)

At the same time New Zealand invests far less in research and development of any kind than other developed countries and has far lower R & D personnel per million population than Australia or Western European countries ... New Zealand is successful educationally, but is, by R & D standards, not becoming a knowledge economy. (p. 89)

There is no easily accessible information about the quantum of expenditure on educational R & D in New Zealand but educational researchers are dependent upon a dedicated central fund of \$1.56 million per annum (that also funds an ongoing longitudinal study) or funding from their universities. Large

grants have been won by educational researchers in the Royal Society's multi-disciplinary Marsden fund¹². The nature of such research has rarely been R & D focussed with only 1.2 per cent of the funding awarded for educational research¹³ between 1998 and 2011. In New Zealand, funding is rarely available for collaborative educational R & D that is sustained over time. The funding that initially enabled the high-impact R & D in each of the first four BES exemplars was either available from postgraduate course funding or it was policy or research funding that was one-off and/or is no longer available for sustained R & D.

New Zealand does not have the resources for the embedded funding for R & D identified in some of the world's improving systems on a 'great to excellent' trajectory such as Hong Kong, which "created the Quality Education Fund, an endowment of HKD 50 billion to support schools that undertake approved school improvement projects or action research ... [required] to be highly practical with immediate benefit to teaching and learning practices" (Mourshed, Chijioke, & Barber, 2010, p. 44).

And this is not a time for new expenditure; rather, reprioritisation. But such high-impact R & D is potentially a value for money driver that can offset risks of ineffective investment in infrastructure and resources. In times when economic growth drivers and social capital are most needed, there is a risk that the *what makes a bigger difference* evidence will not be resourced as a strategic driver for capability-building.

Leaving stakeholders and those providing professional development insufficiently supported by knowledgeable expertise risks a 'symbolic' use of evidence for improvement that does not deliver.

The new BES knowledge signals where strategic investment in collaborative R & D in a small number of high-impact pedagogies can help focus an education system on what Shulman described as the 'signature pedagogies'. Reflecting on the field of research on teaching he said: "One thing is clear: signature pedagogies make a difference. They form habits of the mind, habits of the heart and habits of the hand" (cited in Mourshed, Chijioke, & Barber, 2010, p. 73).

Systemic improvement in education

The New Zealand iterative Best Evidence Synthesis Programme has set the bar high for researchers, policy makers and educators world-wide by asking the all-important question – What makes a difference for students? The BES Programme has become well-known for the rigorous and systematic approach to locating, analysing and synthesizing research material into coherent and useable documents. The results

of various Best Evidence Syntheses have been presented at prestigious educational conferences and several have won awards or been selected to be featured in internationally acclaimed publications. As the BES documents are released they are quickly accessed by practitioners, leaders and policy makers in a wide range of countries as the most trustworthy statement of current knowledge in the field.

The major strength of the BES Programme is its unflinching focus on understanding what is known in various domains about practices and policies that actually have an impact on student outcomes. Policy makers and educators can use the results of each of the BES projects to examine their own practices and chart a course for making changes that will move them towards student success efficiently and effectively.

(Dr Lorna Earl, May 2009)

The Iterative Best Evidence Synthesis Programme has leveraged research to make it available as a resource for improvement. Because the BES knowledge-building work affords primacy, where possible, to what makes a bigger difference for diverse (all) learners in New Zealand, it has particular relevance for local improvement.

For the potential of the BES work to be realised, the knowledge produced across the best evidence syntheses needs to be informing a system improvement and capability-building agenda. Success will depend upon how the *what works* evidence is used in systemic improvement efforts going forward.

The system improvement model developing out of the Iterative Best Evidence Synthesis Programme work is shown in Figure 3 (over). The model is designed to create the system conditions for improvement for diverse (all) learners; *and* to drive accelerated improvement for learners who are underserved or disadvantaged.

Accelerated improvement requires a whole system to function as a collaborative learning community that is advancing progress on the four areas of leverage: pedagogy, educationally powerful connections, professional learning and leadership. The extent to which an education system can activate educationally powerful connections with the lives, experiences, identities, and communities of underserved and disadvantaged learners is crucial for accelerated improvement.

The drivers for accelerated improvement are policy and professional leadership, and value for money investment, in the use of the *what makes a bigger difference* evidence. The engine for accelerated improvement is strategic, collaborative high-impact R & D to build expertise and ‘smart tools’ in areas of most system need. Such R & D is a lever for disciplined innovation. In the New Zealand context, the

BESs and BES exemplars illustrate the importance of Māori (indigenous) and Pasifika leadership in high-impact R & D for accelerated system improvement.

Progressive, effective, scale-up of high-impact approaches across the system is necessary for the potential of high-impact R & D to accelerate system improvement to be realised. Figure 3 highlights the focus and levers for systemic improvement and the importance of expertise in the use of this evidence.

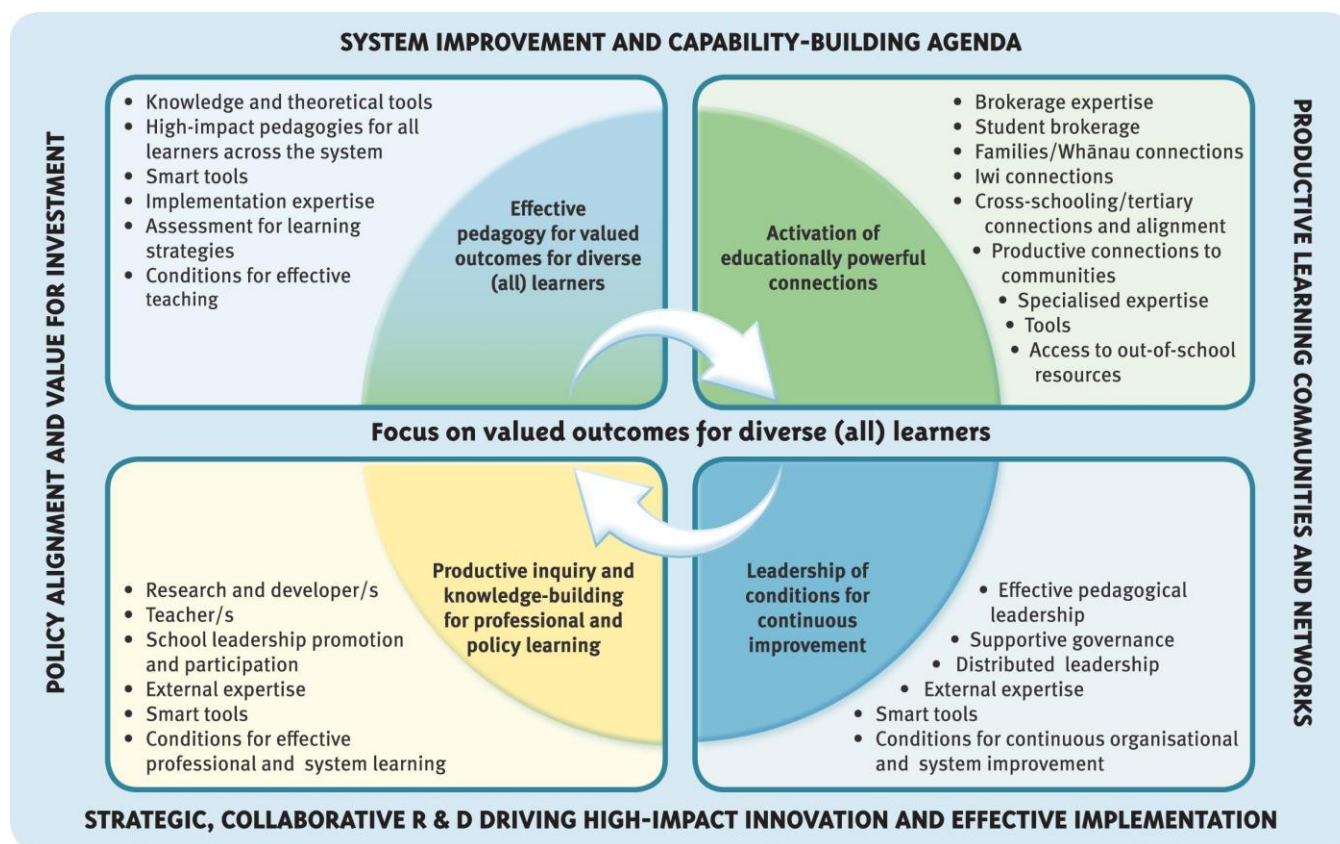


Figure 3. Model for systemic improvement that leverages evidence and expertise to make a bigger difference for valued outcomes for diverse (all) learners

A new international evidence base is emerging about what does bring about whole of system improvement in education. Such evidence can usefully inform education policy for systemic improvement. In some jurisdictions, significant gains have been made on multiple indicators of achievement across schooling in six years or less (Mourshed, Chijioke, & Barber, 2010). The McKinsey analyses of improving schools systems found that success depends primarily on:

- an in-depth focus on improving teaching and learning across a system; and
- getting the ‘how’ of improvement right.

While improvement efforts need to be tailored to the national context, the McKinsey analysis found six interventions to be common for improving systems. The first such intervention is to build professional capability – the pedagogical skills of teachers and the management and leadership skills of principals. Developing capability in assessing students, improving data systems for formative assessment, and revising standards and curriculum were three of the interventions also found to be linked to most improved trajectories (given the priority for pedagogical focus). Affordances for these improvement trajectories were created through teacher and professional education, new policy documents, education laws, and credible, new, and sustained system and policy leadership that was able to spark reform and improve relations with stakeholders. Ongoing improvement was assured through an appropriate reward and remuneration structure for teachers and principals.

Levin (2008; forthcoming) gives a rare and detailed account of the successful policy leadership of change across 5000 schools in Ontario. He describes a coordinated policy, organisational, and system strategy to use research evidence for accelerated systemic improvement that has been associated with whole of system achievement gains.

Levin emphasises a positive stance on improving all schools and success for all students, continuous learning through innovation and the effective use of research and data, effective use of resources, and a strong, focused implementation effort. He highlights the need to keep focus and momentum on key strategies while managing, but not being deflected from improvement by, other interests and issues. The engine for Levin's strategy is strong, knowledgeable leadership and multi-level engagement in capacity-building across the system.

Given a clear plan for capacity-building, Levin's (2008) starting point is the importance of governments identifying a small number of key goals and specific public targets for improvement. As I have been preparing this paper, the New Zealand Government has announced ten targets for the whole of the public sector. These include an education target to achieve 85 per cent of 18 year olds having the New Zealand Certificate of Educational Attainment NCEA level 2 (a senior secondary benchmark qualification) or its equivalent in five years. This would result in a shift from almost 69 per cent of students getting NCEA Level 2 in 2010¹⁴ to 85 per cent attaining at least this school leaver qualification by 2016. Such improvement would generate a big difference in life chances for the additional 16 per cent or around 10,000 students affected each year, with follow-on benefits for economic growth and the public good.

Meeting the target will require systemic and accelerated improvement.

Accelerated improvement will require far greater effectiveness in advancing the national priority for Māori to succeed as Māori in New Zealand education. Only 48 per cent of Māori attained NCEA Level 2 in 2010. Indigenous leadership in high-impact R & D has demonstrated what is effective and ineffective in scaling high-impact intervention in significant areas of national need.

Accelerated improvement will require co-ordinated cross-agency policy, school, and community action to counter the effects of low socio-economic status on educational outcomes. Only 52 per cent of students in schools drawing upon the lowest quintile of socio-economic communities attained NCEA Level 2 in 2010. Such improvement will require the education system to better counter the effects of social inequity; requiring intensive support for improvement, leveraging of community resources, and targeted high-impact intervention.

Accelerated improvement will be needed for Pasifika success also. Only 59 per cent of Pasifika students attained NCEA Level 2 in 2010. The downward trend for Pasifika performance in middle primary mathematics and science, for a much larger Pasifika cohort as demographic patterns rapidly change, requires even more urgent action. Those are the learners who will be striving for NCEA level 2 from 2013.

Success for diverse (all) learners will require using the evidence.

Conclusion: Use Evidence to Improve Education and Serve the Public Good

I rely on the foregoing evidence to conclude with ten key messages for action (see Table 2 over).

Table 2. Use Evidence to Improve Education and Serve the Public Good

1. Effective system-wide educational improvement efforts serve the public good and economic growth, providing returns that can exceed costs.	<i>Use evidence to strategically resource improvement in education.</i>
2. Improvement efforts require an unwavering focus on valued outcomes for diverse (all) learners, with a targeted focus on accelerated improvement for those underserved by schooling or disadvantaged.	<i>Focus on improvement in valued outcomes for diverse (all) learners and accelerated improvement for those underserved by schooling or disadvantaged. Establish goals and expectations for improvement.</i>
3. A collaborative inquiry and knowledge-building approach ensures local responsiveness and enables ongoing improvement across a system.	<i>Use collaborative inquiry and knowledge-building across policy and practice to guide action in ongoing cycles of improvement.</i>
4. Trustworthy bodies of research evidence about <i>what does and does not work, what makes a bigger difference, why, and how</i> can be a resource to inform improvement efforts. Such evidence matters for working smarter for improvement.	<i>Use trustworthy evidence about the <u>what</u> and the <u>how</u> of improvement. In times of fiscal crisis, give priority to leveraging the evidence of what makes a bigger difference.</i>
5. Improved pedagogy for diverse (all) learners is the big change lever.	<i>Ensure knowledge of effective pedagogy drives improvement.</i>
6. There is much evidence of policies and practices that deliver no benefit or do harm in education. The public good requires a shift to alternative policies and practices that work.	<i>Do no harm.</i>
7. Relational trust, stakeholder ownership, and capacity-building are critical to success.	<i>Foster constructive problem talk, build relational trust, and ensure effective supports for improvement.</i>
8. Ongoing improvement of pedagogy relies on aligned action across policy, research, professional education, leadership, and community stakeholders.	<i>Build commitment across stakeholders for aligned action to support ongoing improvement in teaching and learning.</i>
9. Success requires coherent action across four areas of influence: pedagogy, activating educationally powerful connections, professional learning, and leadership of the conditions for improvement.	<i>Leverage all four major areas of influence for accelerated improvement: pedagogy, educationally powerful connections, professional learning, and leadership</i>
10. Expertise matters. Collaborative high-impact research and development can leverage and grow knowledge, disciplined innovation, and adaptive expertise. Ongoing R & D is a driver for capacity-building and the development of smart tools to accelerate improvement to scale.	<i>Invest in collaborative R & D expertise as a driver for accelerated systemic improvement in areas of need. Develop adaptive expertise and smart tools. Scale up effective implementation of high-impact pedagogies across the system.</i>

1

¹ Iterative Best Evidence Synthesis Programme, Hei Kete Reikura (Alton-Lee, 2012)

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¹ “It might be supposed that there was some single method of inquiry applicable to all objects whose essential nature we are endeavouring to ascertain ... In that case what we would seek for would be this unique method. But if there is no such single and general method ... our task becomes still more difficult. In the case of each different subject, we shall have to determine the appropriate process of investigation.” (Aristotle, *De Anima* 1: 10)

² In international comparisons, New Zealand principals, especially principals of rural schools, have been found to work long hours (within a self-managing system) compared to their counterparts (Robinson et al., 2009).

³ In 2007 Professor Jere Brophy received a Thorndike lifetime achievement award from the American Psychological Association. He was editor of the International Academy of Education’s *Educational Practices Series*.

⁴ An effect size can show a positive effect, no effect, or even a negative effect. Negative effects matter because they identify harmful or wasteful practices in education. Hattie (2009) concluded that when evaluating educational outcomes an effect size of $d = 0.60$ is large, an effect size of $d = 0.40$ is medium and an effect size of $d = 0.20$ is small. However, interpretation of the practical significance of effect sizes requires attention to factors such as the duration and cost of the intervention and the importance of the outcome gains.

Hattie found an effect size of $d = 0.35$ to be the average effect of a year’s teaching in reading, mathematics and writing in New Zealand asTTle results across years 4 to 13. The average effect for students of different class levels in different subjects varied. However, $d = 0.35$ provides one useful benchmark when considering the general magnitude of impact of educational interventions. Such a benchmark makes the point that in education we are not making comparisons with no effect; we are making comparisons with business-as-usual practice (Hattie, 2009).

⁵ Go to www.ibe.unesco.org/en/services/online-materials/publications/educational-practices.html

⁶ Dr Lorna Earl is President of the International Congress for School Effectiveness and Improvement. She was previously Director of the International Centre for Educational Change at the Ontario Institute for Studies in Education.

⁷ The term ‘learning style’ is often used loosely in practice but in this context denotes a learner’s apparent preference for an auditory, visual, tactile, or other source and/or expression of information (identified through a learning styles inventory). Within this approach, teachers are encouraged to match mode of information to the learner’s preference. A review by Irvine and York (1995) of evidence about 30 instruments to measure learning styles concluded that, despite the popularity of the Learning Styles Inventory “the design strategy, reliability and validity of the inventory were largely unsupported by the research evidence” (p.487). Other studies highlight several concerns, including distracting teacher attention from the actual learning process, and the potential to restrict opportunities to learn (Alton-Lee, 2003).

⁸ See also the British Educational Research Association’s overview of research on the question *Social inequality can schools narrow the gap?* (Ainscow et al., 2010).

⁹ This refers to the following report by McKinsey & Company: Mourshed, M., Chijioke, C., & Barber, M. (2010). *How the world’s most improved school systems keep getting better*. Available from http://ssomckinsey.darbyfilms.com/reports/EducationBook_A4%20SINGLES_DEC%202.pdf

¹⁰ The Iterative Best Evidence Synthesis Programme is indebted to Professor Marilyn Cochran-Smith, Boston College, for her advice that the term ‘exemplar’ was more appropriate for the new BES work.

¹¹ Palincsar borrowed the term ‘lethal mutations’ from Ed Haertel and explains the concept further in Palincsar (2007).

¹² [Go to www.royalsociety.org.nz/programmes/funds/marsden/about/tor/#objectives-of-the-fund](http://www.royalsociety.org.nz/programmes/funds/marsden/about/tor/#objectives-of-the-fund)

¹³ Over 14 years from 1998 to 2011 the Marsden fund has awarded over half of a billion dollars of research grants (\$584,947,456) with \$7,038,656 awarded to 16 projects with some relevance to early child education or schooling.

¹⁴ The statistics used in this section are derived from Ministry of Education (2012). *Education Indicator: School leavers with NCEA level 2 or above*. Retrieved 19 March 2012 from www.educationcounts.govt.nz/indicators/main/education-and-learning-outcomes/1781